effect of these accompanying diseases on the results of quality of life after total knee arthroplasty is investigated.
Methods: Between 2003 and 2011, 217 total knee arthroplasties were performed in our department. 112 of these patients were evaluated by using Charlson comorbidity index and SF-36 scoring systems retrospectively. Charlson comorbidity index was acquired from the medical records of the patients. Pre- and postoperative SF-36 scores were compared within and among the groups of Charlson comorbidity index.
Results: In regard to Charlson comorbidity index patients were divided into four groups. Patients without an accompanying disease were called Charlson 0 and there were 18 patients in this group. There was 40 patients with one accompanying disease and this group is named as Charlson 1. The number of patients with two accompanying diseases, Charlson 2, and three accompanying diseases, Charlson 3; were 28 and 26 retrospectively. All parameters of SF-36 showed statistically significant increase in the postoperative period. Patients with 3 or more accompanying diseases had statistically significant improvement in respect to other groups on the mental health and general health parameters of SF-36 ($p = 0.0001$).
Conclusions: A significant increase in the quality of life and functional results can be obtained after total knee arthroplasty. The increase in mental health and general health parameters of SF-36 in patients with 3 or more accompanying diseases were attributed to improvement in their depressive status, caused by multiple accompanying diseases, as a result of motivation supplied by mobilization without pain.

P30-1180

Comparison of the changes in the patellar tendon thickness with flexion between meniscal bearing and rotating platform design prosthesis

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Objectives: The low-contact stress (LCS) knee prosthesis is a mobile-bearing design with modifications to the tibial component that allow for meniscal-bearing (MB) or rotating-platform (RP). The MB design had nonconstrained anteroposterior and rotational movement, and the RP design has only nonconstrained rotational movement. The anterior soft tissues, including patellar tendon (PT), prevent anterior dislocation of the MB. Therefore, we hypothesized that the PT thickness with flexion in MB revealed less changes than those of RP due to degeneration of the PT induced by much mechanical stress of the MB movement, and their changes might affect on maximum flexion angle. To confirm this hypothesis, we analyze the changes in the PT thickness with flexion induced by mobile-bearing inserts. Sixty-six LCS prostheses in 33 patients were analyzed. The average follow-up time was 61 months. MB prosthesis was used on one side of the knee and RP prosthesis was used on the contralateral side of the knee. All patients were chosen from group with no clinical complication, and all had achieved passive full extension and at least 90°of flexion. The average Hospital for Special Surgery Score was 94.6 ± 2.7.
Methods: We measured the thickness of PT at joint line level, which were confirmed by sagittal section using ultrasound between extension (EX) and 90° flexion (FX) and compared the patellar tendon thickness ratio (PTTR), which calculated (FX-EX) × 100/EX (%), between MB and RP design prosthesis. Simultaneously we investigated the correlation between maximum flexion angle and PTTR.
Results: The mean PTTR (SD) was −2.6% (12.1) with MB and −3.6% (16.5) with RP design prosthesis. No significant differences ($p = 0.79$) were found between both groups. There was no significant correlation between maximum flexion angle and PTTR in both groups ($p = 0.22$ in MB) ($p = 0.52$ in RP).
Conclusions: The current results rejected 2 our hypotheses. One is that PT thickness with flexion in MB reveals less change than those of RP due to degeneration of the PT induced by much mechanical stress of the MB movement. The other is that their changes might affect on maximum flexion angle. The possible reasons are the following two: (1) We did not remove infra-patellar fat pad, which might play shock absorber of mechanical stress from MB, and prevent from significant degeneration of PT and (2) MB inserts did not move so as to cause degeneration in PT.

P30-1183

Effects of component malpositioning and soft-tissue balancing in total knee arthroplasty kinematics

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Objectives: Clinical outcomes in total knee arthroplasty (TKA) can be affected by implant alignment or ligament balancing. Component malpositioning was already suggested to alter tibiofemoral (TF) and patellofemoral maximum contact forces. However, how component malpositioning and soft-tissue balancing affect TF kinematics has not yet been fully investigated. Our goal was to evaluate how such factors can alter TF kinematics for TKAs knee.
Methods: A validated, dynamic, musculoskeletal model based on computer tomography of a cadaver leg was used to simulate a squat motion up to 120° with a 200 N vertical hip load. The model was implanted with four different cruciate sacrificing TKA types: Type I) a fixed bearing, posterior stabilized design (Genesis II PS); Type II) a fixed bearing, high flexion design (Journey BCS); Type III) a hinge design (RT-PLUS); and Type IV) a mobile bearing design (EPP). All prostheses are from Smith & Nephew, Memphis, TN. Modifications were done to simulate several component malpositions or ligament insertion shifts (balancing) (Table 1). Internal-external (IE) and abduction–adduction (AA) rotations and antero-posterior (AP) translations of the femoral component with respect to the tibial component were finally evaluated for each model during the descent phase of the squat.
Results: Figure 1 shows the maximal effects for malposition scenarios and ligament insertion shifts on the ranges of motion in IE and AA

Table 1 Simulated TKA component malpositions and ligament balancing

Tibial component:	
Antero/posterior translation	±3 mm
Medio/lateral translation	±3 mm
Slope	±3°
Abduction/adduction rotation	±3°
Internal/external rotation	±5°
Lateral collateral ligament:	
Antero/posterior translation	±5 mm
Medial/lateral translation	±5 mm
Proximal/distal translation	±5 mm
Medial collateral ligament:	
Antero/posterior translation	±5 mm
Medial/lateral translation	±5 mm
Proximal/distal translation	±5 mm

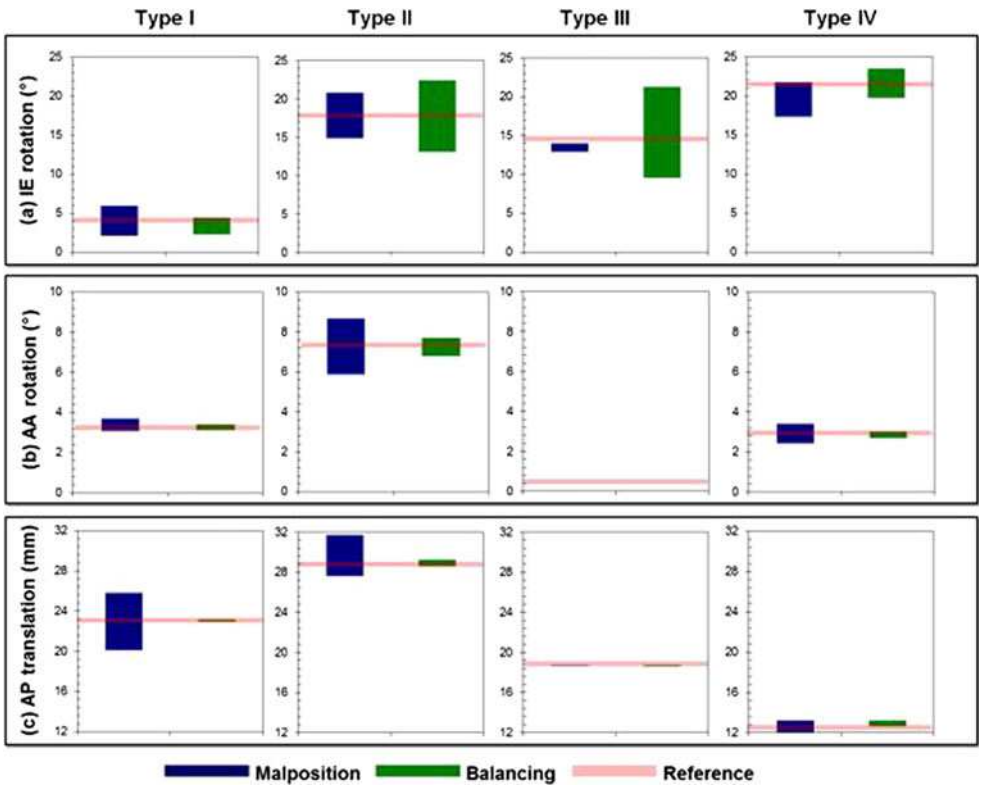

*Fig. 1 For each type of TKA, maximal effects for malposition scenarios (*blue*) and ligament insertion shifts (*green*) on the ranges of motion in: **a** IE rotations, **b** AA rotations and **c** AP translation compared to the reference configuration (*red line*)*

rotations and AP translation compared to the reference configuration (red line). Maximal effects on IE rotations were observed for changes in ligament balancing for some of the designs but malpositioning still affected the measured range of motion (Fig. 1a). Tibial component malpositions affected the ranges of AA rotation and AP translation more than ligament balancing for all designs (Fig. 1b, c).

Conclusions: This numerical study was done not to compare different designs, but to demonstrate that, irrespective of TKA implant design, TF kinematics can be altered by changes in implant positioning and changes in collateral ligament insertions simulating balancing. The predicted effects suggest that both an adequate positioning of the component and balancing of the knee might be important factors to influence clinical outcomes. This study will help guide future research on implant behavior and surgical procedures, ultimately leading to improved TKAs life expectancy.

P30-1218

Five RSA studies to study the safety of the triathlon TKA system: a case for phased innovation in orthopaedics

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Objectives: Market forces continuously apply pressure to the healthcare sector to introduce new orthopaedic devices. However, decisions about any medical treatment should be based on a careful appraisal of the best evidence available. A step-wise introduction is necessary to increase the use of evidence-based decision making in the implementation of new surgical techniques and implants while exposing as few patients as possible to the potential risk of failure (Malchau 2000). RSA is a methodology that should and can be used in the first clinical introduction phase of this Phased Innovation Model (PIM). With an RSA study, a small number of patients identify faulty designs after 2 years of follow-up preventing numerous patients being exposed to inferior prostheses or fixation methods. In this regard, we tested the variety of implants of the Triathlon TKA system introduced in 2005 (Stryker, Mahwah, USA).

Methods: In 5 prospective randomized single center RSA studies with a total of 300 patients the short term fixation after 2 years of follow-up as an indicator for future mechanical loosening was assessed. Knee Society Scores and KOOS clinical scores for all patients were collected as well as normal clinical radiographic evaluations.

Results: The 1st study compared the cemented version of the Triathlon with its predecessor the Duracon total knee. There were no significant differences in the RSA 2-year follow-up data nor in the clinical data ($p < 0.05$), which suggests the Triathlon knee system may replicate the excellent long-term clinical results achieved by the Duracon knee system. This outcome is confirmed by step 4 of the PIM: the Finnish and NJR registries report more than 97% survival after 5 years. The 2nd study compared the CR and PS version and again no significant differences in clinical or radiographic outcomes were found. The 3rd study compared the uncemented PA coated Triathlon with the Pressfit Triathlon. Minimal micromotion of the PA coated tibial components was observed, but higher variability of the Pressfit components. The 4th study showed that the short stem Triathlon has the same migration pattern as the normal stemmed tibia component. The 5th study is comparing the cemented version with the uncemented Triathlon (results expected Q1, 2012). The exposure of this relatively small patient group to the new Triathlon Knee system has showed that the Triathlon Knee system is safe.

Conclusions: A step-wise introduction is necessary to increase the use of evidence-based decision making in the implementation of new surgical techniques and implants while exposing as few patients as possible to the potential risk of failure. RSA is a methodology that should and can be used in the first clinical introduction phase of this